REMARKS:

1) The original specification of this application was essentially a literal translation of a corresponding foreign text. A few editorial and formal amendments have been made in the specification, to streamline the text and improve the form for a US application. For example, the specific reference to "claim 1" has been avoided in the Summary of the Invention by instead copying the text of claim 1, and the Abstract of the Disclosure has been rewritten in appropriate US form. These merely editorial and formal amendments are supported by the substance and the context of the original disclosure and do not introduce any new matter. Entry of the amendments is respectfully requested.

2) The claims have been amended as follows.

Independent claim 1 has been amended to make clear that the selected physical quantity is a physical quantity that characterizes the signal. This clarification is supported by the original disclosure at page 4, lines 5 to 17, and does not introduce any new matter. Also, a few editorial amendments have been made in the original claim text, which was essentially a literal translation of a corresponding foreign claim text. These editorial amendments merely streamline the claim language.

Claim 4 has been amended to delete the unclear term "preferably".

New claims 12 to 22 have been added. The new claims have been drafted "from the ground up" as a fresh approach at covering

the inventive subject matter, with a different claim style and terminology in comparison to the original claims, which were essentially a translation of corresponding foreign claims. The new claims are supported by the original disclosure as shown in the following table and do not introduce any new matter.

New Claims	12	13	14	15	16	17
Original Support	Cl.1,5	Cl.5,7,8	p.6, ln.17	Cl.5	Cl.16	Cl.1

New Claims	18	19	20	21	22
Original Support	Cl.8	Cl.8	Cl.1	Cl.10	pg.2, ln.15-28; pg.5, ln.8-11

Entry and consideration of the claim amendments and the new claims are respectfully requested.

3) Referring to section 5 on page 2 of the Office Action, the objection to the drawings has been addressed in the enclosed Replacement Sheet submitting an amended drawing. Accordingly, please approve the amended Replacement Sheet, and withdraw the objection.

4) Referring to section 6 on pages 2 to 3 of the Office Action, the Abstract of the Disclosure has been rewritten in proper US form. Accordingly, please withdraw the objection to the Abstract.

5) Referring to section 8 on page 3 of the Office Action, claim 4 has been amended to avoid the use of the unclear term "preferably". Accordingly, please withdraw the rejection of claim 4 under 35 USC §112, second paragraph. It is noted that there is no other outstanding rejection of claim 4, so this claim should now be recognized as containing allowable subject matter, because the prior art does not disclose and would not have suggested its now-clearly recited limitation.

6) Referring to section 10 on pages 3 to 5 of the Office Action, the rejection of claims 1 to 3 and 6 as anticipated by US Patent 5,838,074 (Loeffler et al.) is respectfully traversed.

7) Before addressing the particular rejection, the invention will first be discussed in general terms to provide a background.

As explained in the present specification, a bi-directional contactless data transmission is subject to unauthorized interception and redirection via a so-called "relay attack", in which a relaying transceiver is interposed between a base station and a transponder so as to relay an authorization transmission between the transponder and the base station over a larger distance than is intended by the direct secure transmission therebetween. For example, a thief can gain unauthorized access to a vehicle secured by an electronic security system, by using a relay transceiver to relay an authorization transmission between the transponder on the vehicle owner's key fob (for example) and the base unit in the vehicle, when the vehicle owner is at a great distance away from the vehicle. Since the base

station in the vehicle receives the authorization transmission, it "thinks" that the vehicle owner (and the appropriate authorized key fob transponder) are close by the vehicle.

In such a "relay attack" situation, the response signal that is relayed from the transponder via the relay transceiver to the base station exhibits a shift of one of its characteristic physical parameters such as the frequency, the phase, or the amplitude. Conventional systems and methods carrying out such a bi-directional contactless data transmission do not include means to, and are not able to, detect and evaluate such a shift of the pertinent physical parameter of the response signal compared to the expected value thereof. (See the present specification at pages 1 to 3).

This is where the invention comes into play. Particularly, the invention is directed to a method or procedure by which the pertinent selected physical parameter (e.g. frequency, phase or amplitude) of the signal is evaluated by comparing it to the expected or original value, so as to detect any difference, deviation or shift of this selected physical parameter of the signal. If this shift of the selected physical parameter is unacceptably large, e.g. exceeding a threshold value, then the inventive method determines that a re-direction or "relay attack" of the transmission has occurred (or has likely occurred), and can thus block the data transmission.

It must be understood that these features of the inventive method do not involve the generation and transmission of an authorization code modulated onto a response signal, but rather relate to the evaluation of the selected physical parameter of

the signal itself. If a shift or deviation of the physical parameter (e.g. frequency) arises during any leg of the transmission (e.g. in the original transmitted signal or in the returned response signal), then such a shift will be detected in the final comparison that is carried out back in the first transmitter/receiver unit. In other words, the inventive method is separate or independent from an authorization code or other encrypted data that is carried by the transmitted signal, but rather involves the modification and evaluation of the selected physical parameter (e.g. frequency, phase, or amplitude) of the signal itself. Thus, the inventive method can actually be used together (in parallel or in series) with previous conventional methods involving the transmission of authorization codes or the like as modulated data being carried by the transmitted signal (see the present application at page 2, lines 15 to 28 and page 5, lines 8 to 11).

In the inventive method as set forth in present independent claim 1, the second transmitter/receiver unit receives a transmitted signal from the first transmitter/receiver unit and converts this signal into a response signal with regard to at least one selected physical quantity or parameter of the signal. The selected physical quantity may, for example, be the frequency, the phase, the amplitude, or some other characteristic parameter of the signal (see e.g. dependent claim 5). The second transmitter/receiver unit transmits the response signal to the first unit, which then converts the response signal with regard to the selected physical quantity thereof into a test signal. This conversion in the second unit compensates the conversion

that was carried out in the second unit. Then, the test signal is compared to the original transmitted signal. Depending on the result of this comparison, a value is assigned to a manipulation indication, which is indicative of whether a manipulation (e.g. an unauthorized re-direction or relaying) of the transmission has occurred.

8) Loeffler et al. disclose an anti-theft system for a motor vehicle including a base station in the vehicle and a portable transponder.

The transponder derives its operating power through an inductive energy coupling, from the signal transmitted by the base station to the transponder. In order that the power coupling into the transponder is as efficient as possible, it is preferable that the exciter frequency of the signal emitted by the base station matches the resonant frequency of the transponder. To achieve this according to Loeffler et al, the transponder sends a signal at its resonant frequency back to the base station, and the base station measures the resonant frequency of that signal. Then, the base station adjusts the exciter frequency of its output transmitted signal to match the resonant frequency of the transponder (see Abstract and col. 1, lines 28 to 65).

According to a further feature in the system of Loeffler et al., the transponder includes a code generating unit that stores a code information or a computation formula for generating a code word. This generated code word is transmitted from the transponder back to the base station as data modulated onto the

return signal (see col. 1, line 66 to col. 2, line 12). The base station compares the code word that was received from the transponder with a desired code information, and generates an enable signal if the received code word matches the desired code information.

The transmission of a code word as modulated data, and checking whether the code word matches a desired code information according to Loeffler et al. has nothing to do with the present inventive method. Particularly, Loeffler et al. **do not disclose and would not have suggested** a method in which a received transmitted signal is **converted** into a response signal with regard to at least one **selected physical quantity that characterizes the signal**, and then the received response signal is converted into a test signal with regard to the selected physical quantity, so that finally the test signal can be **compared** to the original transmitted signal, to provide a manipulation indication based on the result of this comparison. Loeffler et al. do not disclose or suggest anything in this regard.

The code word according to Loeffler et al. is generated based on code information or a computation formula stored in the transponder, e.g. the second transmitter/receiver unit. This code word is not a selected physical quantity that characterizes the original transmitted signal, and has no connection to the original transmitted signal. In fact, in a preferred embodiment according to Loeffler et al., the code word is based on a **random number**, and clearly a random number is not a physical quantity or parameter of the signal (see e.g. col. 3, lines 24 to 47).

More generally, Loeffler et al. do not disclose and would not have suggested any process of determining and converting a selected physical quantity of the respective signal, and then comparing the de-converted returned value with the original value of this selected physical quantity after a conversion and then a de-conversion thereof, in order to determine whether an unauthorized manipulation has occurred based on the result of this comparison.

For the above reasons, the Examiner is respectfully requested to withdraw the rejection of claims 1 to 3 and 6 as anticipated by Loeffler et al.

9) Referring to section 12 on pages 5 to 9 of the Office Action, the rejection of claims 5 and 7 to 11 as obvious over Loeffler et al. in view of US Patent 4,364,043 (Cole et al.) is respectfully traversed.

10) Claims 5 and 7 to 11 depend from independent claim 1, which has been discussed above in comparison to the disclosure of Loeffler et al.

11) Cole et al. disclose an object identification system and method in which a response signal transmitted from a transponder to a base station has a frequency that is a sub-harmonic of the frequency of the original transmitted interrogation signal. This improves the communication, for example because the response signal is separated from the original interrogation signal.

12) A person of ordinary skill in the art would not have been motivated to combine the teachings of the two references as proposed by the Examiner. Loeffler et al. expressly aim to **match** the frequency of the interrogation signal emitted by the base station to the resonant frequency of the return signal of the transponder, while Cole et al. expressly aim to **mis-match** the frequencies of the two signals such that the return signal has a sub-harmonic frequency relative to the frequency of the interrogation signal. Thus, the express required teachings of the two references are directly contrary and incompatible relative to one another. In other words, a person of ordinary skill seeking to modify the code transmission method of Loeffler et al. would not have turned to the method of Cole et al. using a different frequency, as proposed by the Examiner, for the encoding, because the use of such a different frequency would have been directly contrary to the requirements of Loeffler et al.

13) Moreover, even considering the teachings of Cole et al., the present invention would not have been suggested,

In the Cole et al. system, although the frequency of the response signal is modified based on or relative to the frequency of the original interrogation signal, there is no disclosure or suggestion toward evaluating the frequency in the presently claimed manner. Particularly, Cole et al. do not disclose and would not have suggested to carry out a second conversion of the sub-harmonic frequency of the response signal, so as to generate a test signal, which is then compared with the original

transmitted interrogation signal at the original frequency, in order to determine a comparison result between these two signals, and then to base a manipulation indication on this comparison result.

Even when the teachings of Cole et al. would have been considered in combination with those of Loeffler et al., the present invention still would not have been suggested. As discussed above, Loeffler et al. do not suggest converting and evaluating a signal based on a characteristic physical quantity or parameter thereof, such as the frequency, phase or amplitude. On the other hand, while Cole et al. generate a response signal having a frequency that corresponds to a sub-harmonic of the original interrogation signal, the response signal is not evaluated with regard to the frequency, in order to determine whether a manipulation has occurred. Thus, even a combination of the references would not have suggested these features of the invention.

Since the frequency-regulating teachings of Cole et al. merely relate to the effectiveness of the signal transmission between the base station and the transponder, there would have been no suggestion toward using such teachings for a further evaluation to achieve an improved security.

For example, considering the method of Loeffler et al., in which a random number is used to generate a code word for the authorization process and this code word is transmitted as modulated data on the response signal, a person of ordinary skill in the art would have seen no connection between the amplitude-modulated random number code word according to Loeffler

et al., and the frequency regulation of the carrier frequency of the response signal according to Cole et al. Neither reference provides any suggestion or linkage between a frequency conversion and an authorization code, and neither reference suggests evaluating/comparing the final returned response frequency to the original emitted frequency. Thus, at best, a combined reading of the two disclosures by a person of ordinary skill in the art would simply have resulted in a method in which an authorization code word is transmitted from the transponder back to the base station as data modulated onto a response signal having a frequency that is regulated to be a sub-harmonic of the original transmitted interrogation frequency.

The Examiner's assertion that "*it is obvious to utilize the frequency of the transmitted electromagnetic signal as a selected physical quantity to perform a predetermined algorithm on in the transponder unit for transmission to the interrogator unit*" appears to be simply a post-hoc hindsight combination of disparate and unrelated features of the two references, and even this would not have suggested the present invention.

The Examiner's further suggestion that this would be performed "*so that a comparison could be made to authenticate the transponder unit*" has absolutely no basis, suggestion, or motivation in the prior art, and appears to imply an improper obviousness analysis. Even if such a comparison **could** have been made (which is not suggested in the prior art), there is still no prior art suggestion or motivation that a person of ordinary skill would have done so. An obviousness analysis cannot be based on what is possible (i.e. could be done), but rather what

would have been obvious to do based on suggestions and motivations in the prior art at the time the invention was made. In the present case, the prior art references would have provided no such suggestions or motivations toward the claimed features of the invention.

14) For the above reasons, the Examiner is respectfully requested to withdraw the rejection of claims 5 and 7 to 11 as obvious over Loeffler et al. in view of Cole et al.

15) Referring to section 13) on page 9 of the Office Action, the additional prior art made of record requires no particular comments because it has not been applied against the claims.

16) The new claims 12 to 22 are also patentably distinguishable over the prior art. Particularly, new independent claim 12 sets forth a specific combination of steps and method features that are neither disclosed nor would have been suggested by the prior art as discussed above. Most importantly, the prior art would not have suggested modifying the value of a physical parameter such as the frequency, phase or amplitude of the successive signals, and then comparing a final value of the parameter to the original value of the parameter in order to determine the security of the data transmission.

17) Favorable reconsideration and allowance of the application, including all present claims 1 to 22, are respectfully requested.

Respectfully submitted,

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7/1/04

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